

What is claimed is:

1           1. A built-in antenna for being installed in a housing  
2 of insulating material, comprising:  
3           a metal plate that includes a radiating portion and a  
4 feeder terminal;  
5           wherein the radiating portion includes a plurality of  
6 penetrating holes to be fitted to a plurality of protrusions  
7 provided on the housing side, and a plate spring that is formed  
8 extending from an edge of each of the plurality of penetrating  
9 holes to the center of the each of the plurality of penetrating  
10 holes.

1           2. The built-in antenna according to claim 1, wherein:  
2           the plate spring is inclined a predetermined angle from  
3 the plane of the metal plate.

1           3. The built-in antenna according to claim 1, wherein:  
2           the plurality of penetrating holes have a major axis with  
3 a length of less than half a wavelength of service radio wave.

1           4. An electronic device, comprising:  
2           a built-in antenna;  
3           wherein the built-in antenna comprises a metal plate that  
4 includes a radiating portion and a feeder terminal, and the  
5 radiating portion includes a plurality of penetrating holes to  
6 be fitted to a plurality of protrusions provided on the housing  
7 of the electronic device, and a plate spring that is formed  
8 extending from an edge of each of the plurality of penetrating

9 holes to the center of the each of the plurality of penetrating  
10 holes.

1 5. The electronic device according to claim 4, wherein:  
2 the plate spring is inclined a predetermined angle from  
3 the plane of the metal plate.

1 6. The electronic device according to claim 4, wherein:  
2 the plurality of penetrating holes have a major axis with  
3 a length of less than half a wavelength of service radio wave.

1 7. A method of making a built-in antenna for being  
2 installed in a housing of insulating material, comprising the  
3 step of:

4 punching a metal plate to form a radiating portion and  
5 a feeder terminal in the metal plate;

6 wherein the punching step is conducted such that the  
7 radiating portion includes a plurality of penetrating holes to  
8 be fitted to a plurality of protrusions provided on the housing  
9 side, and a plate spring that is formed extending from an edge  
10 of each of the plurality of penetrating holes to the center of  
11 the each of the plurality of penetrating holes.

1 8. The method according to claim 7, wherein:  
2 the plate spring is inclined a predetermined angle from  
3 the plane of the metal plate.

1 9. The method according to claim 7, wherein:  
2 the plurality of penetrating holes have a major axis with

3 a length of less than half a wavelength of service radio wave.

1 10. A method of installing a built-in antenna comprising  
2 a metal plate that includes a radiating portion and a feeder  
3 terminal in a housing of insulating material, wherein the  
4 radiating portion includes a plurality of penetrating holes to  
5 be fitted to a plurality of protrusions provided on the housing  
6 side, and a plate spring that is formed extending from an edge  
7 of each of the plurality of penetrating holes to the center of  
8 the each of the plurality of penetrating holes, comprising the  
9 steps of:

10 positioning the plurality of penetrating holes to be  
11 fitted to the plurality of protrusions; and

12 pressing the built-in antenna against the housing such  
13 that the plate spring is engaged with each of the plurality of  
14 protrusions.

1 11. The method according to claim 10, wherein:

2 the plate spring is inclined a predetermined angle from  
3 the plane of the metal plate.

1 12. The method according to claim 10, wherein:

2 the plurality of penetrating holes have a major axis with  
3 a length of less than half a wavelength of service radio wave.